

Appl. No. 09/783,377

Amendments to the Claims

Claims 1-20 (Cancelled).

21. (Currently amended) A physical vapor deposition target consisting essentially of:

aluminum having a purity of at least 99.999 atomic percent; and

from greater than 0 ppm to less than or equal to 1000 ppm of one or more dopant materials, the dopant materials including at least one element selected from the group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Ti, and Zn; the dopant material optionally further comprising one or more elements selected from the group consisting of Ag, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Ga, Gd, Hf, Ho, Ir, La, Lu, Mg, Mn, Mo, Nb, Nd, Ni, Os, Pd, Pm, Pr, Pt, Rh, Ru, Sc, Si, Sm, Ta, Tb, Ti, Tm, V, W, Y, Yb and Zr; the physical vapor deposition target having an average grain size of less than 100 microns; and

wherein the target is formed by a process comprising:

providing high purity aluminum; and

adding the greater than 0 ppm to less than or equal to 1000 ppm of one or more dopant materials to the high purity aluminum.

22. (Original) The physical vapor deposition target of claim 21 having an average grain size of less than or equal to 45 microns.

Appl. No. 09/783,377

23. (Previously presented) The physical vapor deposition target of claim 21 consisting of Al, the at least one element selected from the group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Tl, and Zn; and less than 100 ppm of one or more of Si, Sc, Ti and Hf.

24. (Previously presented) The physical vapor deposition target of claim 21 consisting of Al, the at least one element selected from the group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Tl, and Zn; and from 10 ppm to 100 ppm of one or more of Si, Sc, Ti and Hf.

25. (Previously presented) The physical vapor deposition target of claim 21 consisting of Al, the at least one element selected from the group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Tl, and Zn, and from 10 ppm to 100 ppm of Sc; the target having an average grain size of less than or equal to 45 microns.

26. (Previously presented) The physical vapor deposition target of claim 21 consisting of Al, the at least one element selected from the group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Tl, and Zn, and from 10 ppm to 100 ppm of Si; the target having an average grain size of less than or equal to 35 microns.

Appl. No. 09/783,377

27. (Previously presented) The physical vapor deposition target of claim 21 consisting of Al, the at least one element selected from the group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Tl, and Zn, and from 10 ppm to 100 ppm of Ti.

28. (Previously presented) The physical vapor deposition target of claim 21 consisting of Al, the at least one element selected from the group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Tl, and Zn, and from 10 ppm to 100 ppm of Hf.

Claims 29-31 (Cancelled).

32. (Currently amended) A physical vapor deposition target made by a process including casting, consisting essentially of:

aluminum; ~~and~~

from greater than 0 ppm to less than or equal to 1000 ppm of one or more dopant materials, the dopant materials including at least one element selected from the group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Tl, and Zn; the dopant material optionally further comprising one or more elements selected from the group consisting of Ag, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Ga, Gd, Hf, Ho, Ir, La, Lu, Mg, Mn, Mo, Nb, Nd, Ni, Os, Pd, Pm, Pr, Pt, Rh, Ru, Sc, Si, Sm, Ta, Tb, Ti, Tm, V, W, Y, Yb and Zr; the physical vapor deposition target having an average grain size of less than 100 microns; and

Appl. No. 09/783,377

wherein the target is formed by a process comprising:

providing high purity aluminum; and

adding the greater than 0 ppm to less than or equal to 1000 ppm of one or more dopant materials to the high purity aluminum.

33. (Previously presented) The physical vapor deposition target of claim 32 having a size of greater than or equal to 860 x 910 x 19 mm³.

34. (Previously presented) The physical vapor deposition target of claim 32 wherein the physical vapor deposition target is monolithic.

35. (Currently amended) A physical vapor deposition target made by a process including casting and equal channel angular extrusion, the target comprising:

aluminum having an atomic purity of at least 99.99%;

at least one dopant material selected from the group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Tl and Zn; and

at least one element selected from the group consisting of Ti, Ta, W, Sc, Co, Mo, and Hf; and

wherein formation of the target comprises:

providing high purity aluminum; and

adding the at least one dopant material to the high purity aluminum.

Appl. No. 09/783,377

36. (Previously presented) The physical vapor deposition target of claim 35 wherein the total amount of the at least one element comprised by the target is from greater than 0 ppm to less than 1000 ppm.

37. (Previously presented) The physical vapor deposition target of claim 35 wherein the target consists essentially of the aluminum, the at least one dopant, and the at least one element.

Claims 38-39 (Cancelled).

40. (Currently amended) A physical vapor deposition target made by a process including casting, consisting essentially of:

aluminum; and

greater than 0 ppm and less than or equal to 1000 ppm of elements selected from the group consisting of Ac, Ag, As, B, Ba, Be, Bi, C, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Lu, Mg, Mn, Mo, N, Nb, Nd, Ni, O, Os, P, Pb, Pd, Pm, Po, Pr, Pt, Pu, Ra, Rf, Rh, Ru, S, Sb, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Ti, Tl, Tm, V, W, Y, Yb, Zn and Zr, at least one of the elements being selected from the group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Tl, and Zn, the physical vapor deposition target having an average grain size of less than 100 microns; and

wherein the target is formed by a process comprising:

Appl. No. 09/783,377

providing high purity aluminum; and

adding the elements to the high purity aluminum.

41. (Previously presented) The physical vapor deposition target of claim 40 wherein the aluminum has a purity of at least 99.99 atomic percent.

42. (Currently amended) A physical vapor deposition target consisting essentially of:

aluminum having a purity of at least 99.99 atomic percent; and
from greater than 0 ppm to less than or equal to 1000 ppm of one or more dopant materials comprising elements selected from the group consisting of Ac, Ag, As, B, Ba, Be, Bi, C, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Lu, Mg, Mn, Mo, N, Nb, Nd, Ni, O, Os, P, Pb, Pd, Pm, Po, Pr, Pt, Pu, Ra, Rf, Rh, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Ti, Tl, Tm, V, W, Y, Yb, Zn and Zr; at least one of the dopant materials being selected from the ~~group~~ group consisting of Ac, As, B, Ba, Be, Bi, C, Ca, Cd, Ge, In, N, O, P, Pb, Po, Pu, Ra, Rf, S, Sb, Se, Sn, Sr, Te, Tl and Zn; the physical vapor deposition target having an average grain size of greater than 20 microns and less than 100 microns; and

wherein the target is formed by a process comprising:

providing high purity aluminum; and

adding the greater than 0 ppm to less than or equal to 1000 ppm of one or more dopant materials to the high purity aluminum.

Appl. No. 09/783,377

43. (Previously presented) The physical vapor deposition target of claim 42 wherein the aluminum has a purity of at least 99.995 atomic percent.

44. (Previously presented) The physical vapor deposition target of claim 42 having less than or equal to 100 ppm of the one or more dopant materials.

45. (Previously presented) The physical vapor deposition target of claim 40 wherein the at least one element is Be.

46. (Previously presented) The physical vapor deposition target of claim 40 wherein the at least one element is Ge.